British 1086 366/23

A.D. 1863, April 29, N° 1086.
HENRY'S Specification.

art Stove

1 SHEET.

FIG. 1.

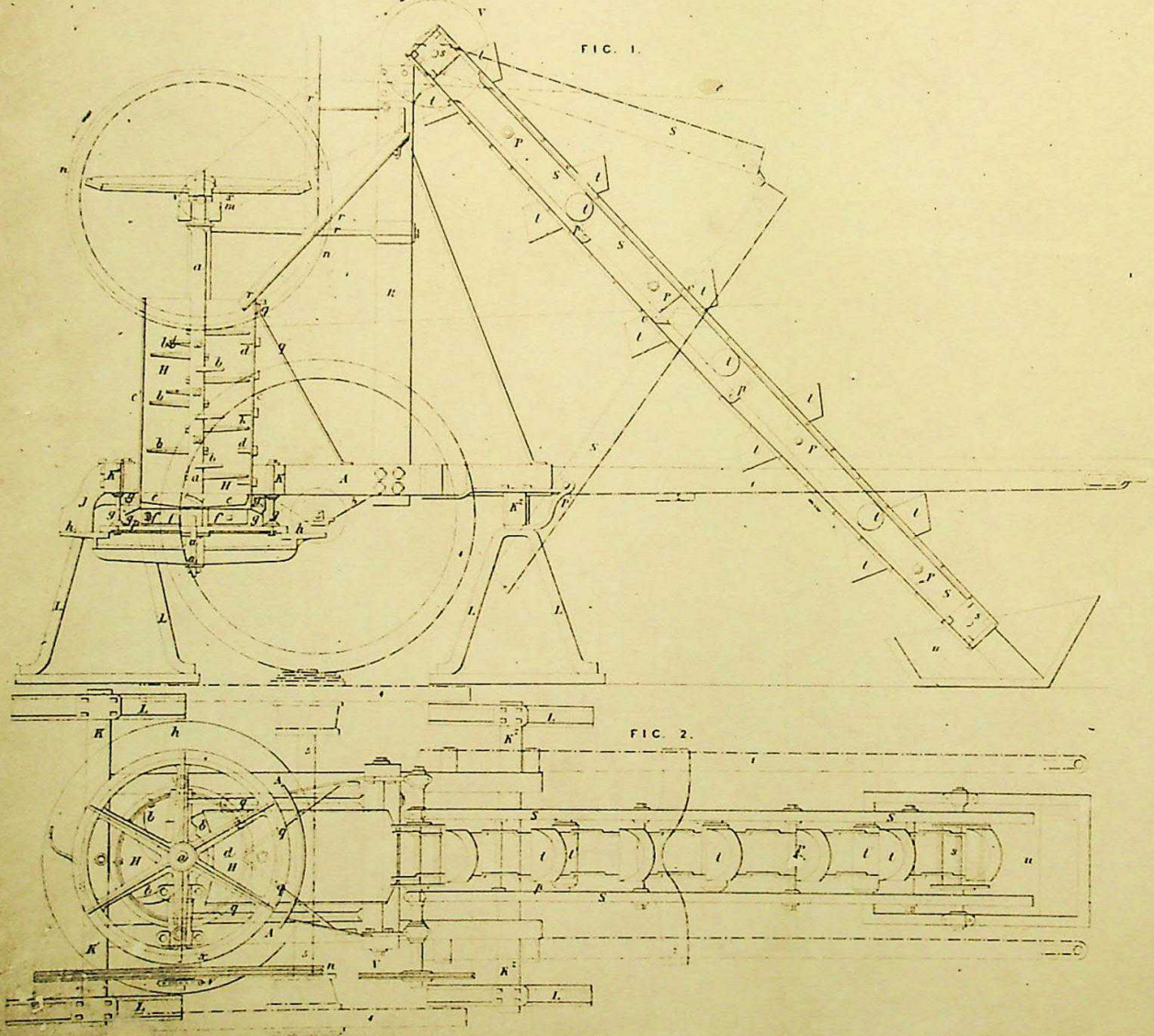


FIG. 2.

FIG. 3.

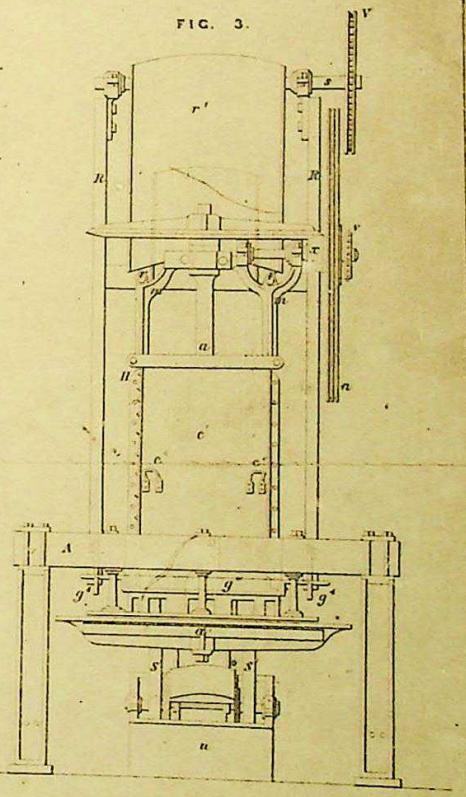
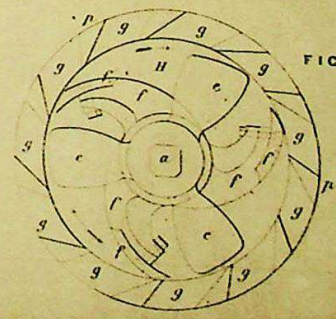


FIG. 4.



Sealed drawing is 1 ed.

Machine Process

Sand
Hydraulic lime
Portland c.

Textile
Fabric
Wire cloth
Nails &c

A.D. 1863, *29th April.* N° 1086.

Manufacture of Beton and Artificial Stone, &c.

LETTERS PATENT to Michael Henry, of 84, Fleet Street, in the City of London, Patent Agent, for the Invention of "IMPROVEMENTS IN APPARATUS FOR MANUFACTURING BETON AND ARTIFICIAL STONE, PUGGING CLAY, AND OTHER SIMILAR PURPOSES, AND IN THE PRODUCTION OF ARTIFICIAL STONE, AND ARTISTIC, ORNAMENTAL, AND DECORATIVE ARTICLES, WORKS, AND SURFACES."—A communication from abroad by François Coignet, of 33, Boulevard Saint Martin, Paris, France.

Sealed the 2nd October 1863, and dated the 29th April 1863.

PROVISIONAL SPECIFICATION left by the said Michael Henry at the Office of the Commissioners of Patents, with his Petition, on the 29th April 1863.

I, MICHAEL HENRY, of 84, Fleet Street, in the City of London, Patent Agent, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN APPARATUS FOR MANUFACTURING BETON AND ARTIFICIAL STONE, PUGGING CLAY, AND OTHER SIMILAR PURPOSES, AND IN THE PRODUCTION OF ARTIFICIAL STONE, AND ARTISTIC, ORNAMENTAL, AND DECORATIVE ARTICLES, WORKS, AND SURFACES," communicated to me from abroad by François Coignet, of 33, Boulevard Saint Martin, Paris, France, to be as follows:—

This Invention first relates to improvements in machinery for manufacturing Coignet's and other betons and artificial stones, mixing materials for concretes, pugging clay, and other similar purposes.

According to one improvement, arrangements are provided for obtaining a continuous and free discharge of the materials from the machine after being kneaded, pugged, or otherwise acted upon therein. For this purpose a continuous or nearly continuous or undivided ejection opening, or spacious or

numerous ejection openings, are provided. This ejection opening may extend continuously or nearly continuously round the bottom or exit end of the machine, or large or numerous ejection openings may be distributed all round that part, so that the materials, after having been acted on, shall be discharged freely and continuously with little or no obstruction or resistance. Appliances may be provided for guiding, compressing, or forcing and expelling the materials. In a machine in which the various improvements are combined an axis carrying arms or blades revolves in a chamber or casing, such casing is constructed in three parts connected together, of which one is fixed below the other two; of the two upper (which are preferably semi-cylindrical) one carries the frame of the shaft, and the other is removeable to allow of the interior being examined and cleansed; in the third or underneath part are the ejection openings. The axis is generally straight-sided, with arms disposed at intervals and presented in various directions. On the sides of the casing are fixed arms or stops projecting between the revolving arms; on the axis below the arms is a wheel, or set of radiating or diverging spiral arms or vanes, which press the materials towards the ejection orifices, and below this is an appliance for driving the materials through those orifices consisting of a wheel or set of radiating or diverging cycloidal, curved, or segmental cams or vanes, dished or not, and having at their extremities hard removeable tips, which may be replaced by fresh ones when worn. These cams are so disposed that they may be said to overlap or break joint with the spiral vanes. The area of passage through the ejection openings may be regulated by a circular valve or disc adjusted by screws, graduated hooks, or other means. The exit ways may be divided by partitions, rods, or not. Below the ejection openings the axis carries a plate which, as it revolves, receives the materials discharged and throws them (by the aid of guide plates) in separate heaps, or into any desired receiver. Rotary motion is communicated to the axis, and thence transmitted to a feed screw and elevator herein-after mentioned. The machine is moved from place to place on a carriage, from which it is readily removeable when to be set at work; it is then supported on A-shaped feet, which, when the machine is on its carriage, are taken off and reversed and fixed on again in that wise. The carriage axle is under the centre of gravity of the apparatus. Water for damping the materials may be admitted through a perforated pipe bent round the inside at top. The materials, after having been treated in one machine, may be ejected into the trough of a second to repeat the treatment. The materials are taken (from a hopper or feed box) and conveyed into and mixed in a trough or receiver by means of a double-threaded endless screw with interrupted threads, that is to say, threads composed of a series of blades

arranged like the sails or wings of a windmill; this screw and casing may be set at any desired angle to regulate the feed. This may be done without interfering with the driving appliances, which are fitted in a frame. The materials are raised from the trough into the machine by an elevator constructed like a dredger, and having concave shoots at its upper end. This elevator is jointed, so that it can be folded for convenience of transport, the chain being fastened by pins to prevent it from swinging.

The Invention also relates to the production of artificial stone and artistic and ornamental articles, surfaces, and works in Coignet's beton or composition. For these purposes the best materials should be used in the beton, such as theil or blue lias lime and Portland cement or other superior ingredients. The powdered lime and cement should first be mixed in a dry state and combined with sand, broken or powdered marble, glass, granite, flint, or other hard natural stone or substance, and mineral color if required. When mixed they are introduced into the machine described with a little water, and after having been treated therein are left at rest a little while and subjected to a second treatment in the same or another like machine; this may be repeated or protracted. The whole is then subjected to sustained and forcible agglomeration, and a product will be obtained capable of being polished by friction. For this purpose it is first indurated by drying, exposure to air, or coating with biphosphate or bicarbonate of lime, or silicates, or other saline matter, and is then rubbed with sandstone grit, emery, trip, rouge, or other such matters, employed consecutively or otherwise. If this should rub off the outer or indurated surface the block or piece of beton or composition is washed and again dried and indurated by coating with saline matters. This may be repeated after each polish.

Varied effects may be obtained by mixing with the beton or composition sands of different colors or qualities, also variously-colored granite, sandstone grit, marble, flints, glass, or other substances. The outer surfaces or portions, or those intended to be polished, need only be so prepared or mixed with the colored or variegating matters, the rest of the block being left in a state of plain beton.

Artistic works, imitative of sculpture, relievos, and the like, may be produced by forcing, pressing, ramming, or agglomerating the plastic beton in moulds or matrices, preferably composed of well-tempered plaster coated with oil or treated with alum, or of beton, Portland current, or other plastic absorbent substance.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Michael Henry in the Great Seal Patent Office on the 29th October 1863.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, MICHAEL HENRY, of 84, Fleet Street, in the City of London, Patent Agent, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-ninth day of April, in the year of our Lord One thousand eight hundred and sixty-three, in the twenty-sixth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Michael Henry, Her special licence that I, the said Michael Henry, my executors, administrators, and assigns, or such others as I, the said Michael Henry, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN APPARATUS FOR MANUFACTURING BETON AND ARTIFICIAL STONE, PUGGING CLAY, AND OTHER SIMILAR PURPOSES, AND IN THE PRODUCTION OF ARTIFICIAL STONE, AND ARTISTIC, ORNAMENTAL, AND DECORATIVE ARTICLES, WORKS, AND SURFACES," communicated to me from abroad by François Coignet, of 33, Boulevard Saint Martin, Paris, France, upon the condition (amongst others) that I, the said Michael Henry, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Michael Henry, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, as communicated to me, reference being had to the accompanying Drawings, and to the letters and figures marked thereon, that is to say :—

This Invention mainly refers to the manufacture and application of a certain beton, composition, or artificial stone, for which François Coignet obtained British Letters Patent respectively numbered 2659 and 2757, and dated 26th November 1855 and 6th December 1859.

The Invention first relates to improved machinery for manufacturing

Coignet's patent beton or artificial stone, such machinery being also applicable for mixing concrete, pugging clay, working mortar, and other similar purposes. Machines hitherto constructed for these objects have been provided with one or two small ejection orifices, through which the materials were forced out or discharged. Now, according to this Invention, the machine is formed with an ejection opening extending continuously or nearly continuously, or without or nearly without division or break, round the discharge end of the machine; or large or numerous, or both large and numerous, ejection openings are distributed all round that end of the machine. By these means the materials, after having been mixed, pugged, or treated in the machine, are discharged therefrom freely and continuously with little or no obstruction or resistance. The chamber or casing of the machine is constructed of three parts, one of which, wherein are the ejection openings, being below the two others, and one of these latter is removeable, so that the chamber may be easily cleansed. In this chamber a shaft revolves, carrying appliances for mixing, kneading, or otherwise acting on the materials, and others for pressing, drawing, or heaping them towards the ejection orifices and for discharging them therefrom. The passage through the ejection orifices may be regulated by an annular valve.

The accompanying Drawings represent a machine constructed according to this Invention.

Figure 1 is a side elevation thereof, partly in section; Figure 2, plan; Figure 3, end view; and Figure 4 is a horizontal section on a larger scale through the lower part, showing the discharging arrangements.

A is the framework; H is a casing or chamber composed of three pieces, a cast-iron bottom portion p and two upper semi-cylindrical sheet-iron portions c and c^1; g^1, g^1, are bolts for securing the part p to the frame A; q are knee pieces, and q^1 braces for securing the portion c to the frame A; the back portion c^1 is secured or bolted to the portion c, so that it may be removed therefrom by its handles c^{11}, in order to get at the interior of the chamber to clean it; m is a cast-iron frame, which is fixed within the part c, and supports a collar in which an axis a turns; g, g, are ejection orifices formed in the portion p. Instead of there being only one or two small ejection orifices as usual, these orifices are distributed around the entire circumference of the lower part of the casing; they may be separated by slender columns or rods instead of by partitions, as shown, or the separations or partitions may be wholly dispensed with, and the ejection opening may extend continuously or without break (or nearly so) round the portion p, so that the materials, after being mixed, will be discharged in a continuous sheet from every or nearly

every point of the circumference of the part p. a is a square axis fitted in the casing H; this axis carries arms b, b, b, which project from it in various directions; d, d, are blades or abutments which are fixed to the sides of the casing H, and project between the arms b; they assist to divide the materials and prevent them from turning in a mass or lump; e is a fan or wheel which is fixed to the axis a below the arms b, and consists of three or more spiral arms or blades, which draw and press or heap the materials towards the bottom of the chamber H; f, f^1, is another fan or wheel, which is fixed to the axis a immediately under the fan e, and consists of three or four cycloidal or segmental blades or arms, so set as to break joint with the blades e, or extend beyond them, as shown in Figure 4; this wheel f, f^1, drives the materials through the orifices g. The ends f^1 of the arms f, being exposed to much wear, are removeable, each end f^1 being a tip of hardened cast iron screwed to the shank f, so that it may be readily detached therefrom when worn or broken and replaced by a fresh one. The form of blade f shown is suitable when the casing has thick sides, but for one with thin sides dished cams are preferred. Around the lower part of the casing is a ring or annular valve g^{111}, which extends round the openings g, and is so supported on graduated hooks g^4, or by set screws, that it may be adjusted to regulate the area of passage through the openings g as required. a^1 is a short axis, which is secured to and revolves with the axis a, and passes through the bottom p of the casing H. To this axis a^1 is fixed an annular plate h, which receives the products discharged through the orifices g, and projects them towards guide plates or deflectors j, by which they are thrown into separate heaps, or into trucks or other ordinary receivers. Rotary motion is communicated to the axis a, a^1, and thence to a feed screw and elevator, herein-after described; this may be done as shown, by a pulley n and bevel pinion x, actuated by a stationary steam engine or by a portable engine fixed on the carriage of the machine. K^1, K^2, are cross frame bars secured to the frame A; to the ends of these bars are screwed four legs L, which are constructed of H or girder iron, and support the machine when it is at work; but when it is to be moved from place to place it is mounted on a carriage or truck, shown in red lines, Figure 1, the legs L being unfastened and reversed, and screwed on the bars K^1, K^2, in such reversed position. 1, 2, are the carriage shafts; 4, its wheels; 5, axle; 6, axle box. When the machine is on its carriage the axle 5 lies under the centre of gravity of the machine, and thereby keeps it in equilibrium. The machine is taken off its carriage when at work. The frame m supports the pulley n and its gearing; u is a trough into which the materials to be treated are first fed, and in which they undergo a preliminary mixture, being taken from a hopper or other

holder, and conveyed into and mixed in this trough u by means of an endless feed screw not shewn in the Drawings; this screw has an interrupted double thread, that is to say, a set of blades disposed like the sails of a windmill; it works in a casing, and is driven by the pulley n; the screw with its casing may be set at any required angle of inclination (so as to regulate the feed and amount of mixture) without interfering with its rotation. For this purpose the screw is driven by a bevil wheel on one end of its axis, which extends outside the casing, and on the axis of this wheel is a pulley driven by the pulley n (through a wire or other band); the whole is mounted in a frame, so that the screw axis may be set at various angles without interfering with the driving gear. Materials, after being mixed in the chamber H of one machine, may be transferred directly into the trough u of another, and so on. The materials are raised from the trough u into the chamber H by an elevator S, S^1, which is constructed like a dredger, and provided with buckets t, t, and with concave shoots r^1, r^{11}, which guide the materials from the buckets into the chamber H. This elevator is jointed, so that it can be folded for convenience of transport. For this purpose the lower chain is first secured by pins p^{11}, passed through lugs in the frame S, so as to prevent the chain from swinging. The elevator is then folded at the cone joints o, o^1, and the frame bar P brought on to the hooks P^1. The shafts 1, 2, may then be fitted to the machine, and the horse harnessed thereto. t^1 are the rollers of the elevator; R, R, are two uprights fastened to the frame A, and also secured to the frame m by struts r, to support the elevator with its shoots, and a wheel V which works the buckets t, and is keyed on the upper shaft s; it is driven by an endless chain passing over a wheel v on the axis of the pulley n. The machine may be thus used for the manufacture of beton. For this purpose the axis a, a^1, may have an ordinary speed of, say, 6 revolutions per minute, the pulley n working at about 36 revolutions, and the elevator axis 12 revolutions per minute.

The materials having first been pulverized are partially mixed in the trough u by the endless screw. The feet of the elevator are submerged in this trough, and the materials are raised thence by the buckets into the casing H; water is gradually poured therein in quantities proportionate to the charge, either by hand or by a perforated pipe round the inner sides of the neck of the chamber. As the materials begin to fall into the chamber, the valve g^{111} is partly closed, but it is raised when the machine is charged, so as to keep the chamber about three parts full. By the use of the above machine for mixing the beton a superior product is obtained.

The Invention next relates to the production of artificial stone, and of artistic and ornamental surfaces, articles and works in Coignet's patent beton

or composition. The best ingredients should be used in the process; as, for example, theil, or blue lias lime, and Portland cement. The lime, reduced to powder, and the cement are first mixed in a dry state, and combined either separately or together with sand, broken or powdered marble, glass, granite, silex, or flint, or fragments of other hard natural stone (or two or more of these), and mineral color is added according to the tint requisite; the ingredients are then placed in the machine above described, with a little water, in quantities varying according to the dampness of the sand (or material used instead of it), and acted on by the arms or blades therein, and after the materials have been mixed or treated in one machine, say, for 15 to 20 minutes, they are subjected to a second similar treatment in the same or another like machine, and then to a third similar treatment, or the second treatment may be protracted. The materials are then subjected to sustained and forcible agglomeration or ramming. The product obtained will be capable of taking a polish by friction, being so hard, compact, and uniform, that instead of being surfaced as hitherto by adding an artificial polish or face, it can be polished by rubbing with agents (grit, emery, rouge, and the like,) hitherto employed for polishing glass, crystal, and stones. For this purpose the beton is first indurated by drying, exposure to air, or coating it with biphosphate or bicarbonate of lime or soda, or with phosphates or silicates, or other like saline matter, and it is then rubbed with sandstone grit, emery, trip, rouge, or other such hard agents, employed consecutively, or otherwise. If this polish should rub away the outer or indurated surface of the block or piece of beton, and expose the softer or interior part, the surface so exposed is washed, dried, and again coated with saline matters till a fresh indurated face is obtained. The coating may be repeated after each polish. Beton intended for being thus polished should be brought to a hardness equal to that of natural hard stones, to resist disruption, and sustain considerable pressure or weight.

A suitable formula for many cases is as follows:—

Sand, or crushed marble or granite	5 parts.
Powdered theil lime	1 „
Portland cement	·75 „
Or, sand, marble, hard powdered stone	4 parts.
Theil lime	1 „
Portland cement	·50 „

The latter mixture should undergo a longer damping or exposure to air before polishing than the former.

Among the colors which may be produced are red, brown, grey, pearl grey,

and bottle green. When white cement is used, blue and light green may be obtained.

Imitations of agate, porphyry, jasper, granite, and other varied effects may be produced by mixing with the beton or composition sands of different colors or qualities, also variously colored granite, sandstone, red, pink, or other grit, marble, colored flint, and glass, fragments of natural or artificial stone, or other substances.

To save expense the outer portions of the blocks or pieces of beton only require to be so prepared or mixed with these colored or variegating matters; that is to say, the colored or variegating agents need only be mixed with the beton to a small depth from the surface, say, about $\frac{1}{4}$ or $\frac{1}{2}$ an inch, the rest of the block being left plain.

The various products may be moulded into various shapes and sizes, and applied for producing various useful and ornamental articles, such as vases, basins, pedestals, balusters, columns, tablets, panels, and many others.

When Coignet's Patent beton or artificial stone, produced according to his former Patents, or according to these improvements, is to be of considerable strength and tenacity, the ingredients composing it should be mixed with textile materials, or with metallic web or wire cloth, or with nails, hooks, wires, or other fragments or particles of metal, which act as binding agents, and render the composition especially suitable for facing or forming parts or buildings, such as jambs and styles of doors and windows, (whereby joists, transoms, and beams may be dispensed with,) and for constructing fortifications, arches, aqueducts, and other works in a monolyth form.

Artistic works imitative of sculpture, statues, busts, relievos, and carvings, and cornices, mouldings, and the like, may be produced by forcing or pressing, and ramming or agglomerating Coignet's plastic beton or composition in moulds or matrices composed of well-tempered plaster coated with oil, or treated with alum, or in moulds composed of Coignet's patent or agglomerated beton, or of Portland cement, or other like plastic absorbent substance. The beton may be deposited in layers in such moulds till these be suitably filled, and is then to be rammed or agglomerated by repeated blows of a hard and heavy instrument. Moulds formed of the above substances will sustain the repeated blows of the pestle, stamper, or other instrument used for agglomerating or ramming the beton without being broken or cracked, provided a sufficient layer of beton be left between the sides of the mould and the parts where the working end of the stamper or ramming instrument shall fall, the beton or composition acting as a pad to break the force of the blow, and as it penetrates

readily into the hollows of the mould, the nicest and finest details of form will be reproduced. The beton used for these artistic works or imitations may be plain, or mixed with colored or variegating agents.

Having now described the nature of the said Invention, and in what manner the same may be performed, I declare that I claim, in respect of machines for manufacturing beton, mixing concrete, pugging clay, and other similar purposes,—

First, I claim the construction of such machine with an ejection or discharge opening extending continuously or nearly continuously, or without or nearly without break or division, round, at, or about the discharge end of the machine, so that the materials, after being acted on therein, may be discharged thence freely and continuously without resistance or obstruction.

Second, I claim the construction of such machine with large and numerous ejection or discharge openings distributed all round or about the discharge end of the machine, so that the materials acted on may be discharged freely and continuously, as described.

Third, I claim the employment of a casing or chamber formed of three portions, whereof one is removeable, and another contains an opening extending all round or nearly all round the discharge end, or numerous openings distributed all round such end, such openings being opened or closed by an annular valve, and such casing or chamber containing revolving appliances for pugging, mixing, kneading, or reducing, and for drawing, pressing, or heaping and expelling the materials, substantially as described.

Fourth, I claim the mode of combining the machine with a carriage, as herein-before described.

Fifth, I claim the arrangement and combination of parts constituting the improved machine, herein-before described.

And in respect of the production of artificial stone, and artistic, ornamental, and decorative articles, works, and surfaces, I claim,—

First, the employment in the production thereof of machinery having a continuous, or nearly continuous ejection opening; or having ejection openings distributed all round the discharge end, so as to obtain a free or continuous discharge of the materials acted on, as described.

Second, the employment of machinery arranged and combined as herein described.

Third, the production of Coignet's beton, or polished and unpolished artificial stone in the improved manner described.

Fourth, the production of imitations of agate, porphyry, jasper, and granite,

and other decorative, artistic, and ornamental articles, works and surfaces, and artificial stone by employing colored and variegated agents in the manufacture of the Coignet's patent beton or composition, as described.

Fifth, the production of ornamental works, blocks, or articles by mixing colored or variegating agents with the beton at or near the surface or outer portion of the block or piece, leaving the rest thereof unmixed, as described.

And in respect of works and articles imitative of statuary, sculpture, carvings, relievos, and the like, I do not claim the use of plaster moulds generally, apart from the employment thereof in the manner and for the purpose herein described; but what I do claim is, the production of works and articles imitative of statuary, sculpture, relievos, carvings, and the like, by moulding and ramming, or agglomerating Coignet's beton or composition in moulds composed of plaster, beton, cement, and similar materials, as described.

In witness whereof, I, the said Michael Henry, have hereunto set my hand and seal, this Twenty-ninth day of October, One thousand eight hundred and sixty-three.

M. HENRY. (L.S.)

Witness,
S. E. A. NEWSOME,
84, Fleet Street.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1863.